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METHOD AND APPARATUS FOR MARKING OF WEB PAGES

CROSS REFERENCE TO RELATED APPLICATIONS

The present invention is related to an application entitled *Method and Apparatus for Marking of Web Page Portions for Revisiting the Marked Portions*, serial no. 10/427,130, attorney docket no. AUS920030102US1, filed April 30, 2003, assigned to the same assignee, and incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Technical Field:

The present invention relates generally to an improved data processing system and in particular, a method and apparatus for processing data. Still more particularly, the present invention provides a method, apparatus, and computer instructions for marking portions of a Web page so that those portions may be revisited at a later time.

2. Description of Related Art:

The Internet, also referred to as an "internetwork", is a set of computer networks, possibly dissimilar, joined together by means of gateways that handle data transfer and the conversion of messages from a protocol of the sending network to a protocol used by the receiving network. When capitalized, the term "Internet" refers to

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the collection of networks and gateways that use the TCP/IP suite of protocols.

The Internet has become a cultural fixture as a source of both information and entertainment. Many businesses are creating Internet sites as an integral part of their marketing efforts, informing consumers of the products or services offered by the business or providing other information seeking to engender brand loyalty. Many federal, state, and local government agencies are also employing Internet sites for informational purposes, particularly agencies which must interact with virtually all segments of society such as the Internal Revenue Service and secretaries of state. Providing informational guides and/or searchable databases of online public records may reduce operating costs. Further, the Internet is becoming increasingly popular as a medium for commercial transactions.

Currently, the most commonly employed method of transferring data over the Internet is to employ the World Wide Web environment, also called simply "the Web". Other Internet resources exist for transferring information, such as File Transfer Protocol (FTP) and Gopher, but have not achieved the popularity of the Web. In the Web environment, servers and clients effect data transaction using the Hypertext Transfer Protocol (HTTP), a known protocol for handling the transfer of various data files (e.g., text, still graphic images, audio, motion video, etc.). The information in various data files is formatted for presentation to a user by a standard page description language, the Hypertext Markup Language (HTML). In

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addition to basic presentation formatting, HTML allows
developers to specify "links" to other Web resources
identified by a Uniform Resource Locator (URL). A URL is
a special syntax identifier defining a communications path
to specific information. Each logical block of
information accessible to a client, called a "page" or a
"Web page", is identified by a URL. The URL provides a
universal, consistent method for finding and accessing
this information, not necessarily for the user, but mostly
for the user's Web "browser". A browser is a program
capable of submitting a request for information identified
by an identifier, such as, for example, a URL. A user may
enter a domain name through a graphical user interface
(GUI) for the browser to access a source of content. The
domain name is automatically converted to the Internet
Protocol (IP) address by a domain name system (DNS), which
is a service that translates the symbolic name entered by
the user into an IP address by looking up the domain name
in a database.

With the increased usage of the Internet as a source
of information, the number of Web pages present on the
Internet has increased dramatically. The Internet has
hundreds of thousands of Web sites that may be visited by
users of Web browser applications. Each of these Web
sites may have a plurality of Web pages associated with
them that may be visited by users of Web browsers.

When a user is searching for information on the
Internet, the user may often visit a number of Web sites
and a number of Web pages associated with these Web
sites. Often, a user may desire to return to a Web page

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previously visited because a portion of the Web page may
have been of interest to the user. However, the user
must re-request the Web page and again attempt to locate
the portions of the Web page that were of interest. With
current Web browsers and Web sites, an ability for a user
to mark portions of a Web page and have those marked
portions for revisiting the Web page is absent. Thus, it
would be beneficial to have an apparatus and method for
marking portions of a Web page for later revisiting the
Web page.

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SUMMARY OF THE INVENTION

The present invention provides a method, apparatus, and computer instructions for marking a Web page in a data processing system. A user input is received to mark a portion of the Web page displayed in the data processing system to form a marked portion. An identifier of the marked portion is stored in a local data structure in the data processing system. A subsequent retrieval of the Web page results in a presentation of the Web page with the marked portion. This presentation is made using the identifier stored in the local data structure.

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BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a pictorial representation of a network of data processing systems in which the present invention may be implemented;

Figure 2 is a block diagram of a data processing system that may be implemented as a server in accordance with a preferred embodiment of the present invention;

Figure 3 is a block diagram illustrating a data processing system in which the present invention may be implemented;

Figure 4 is a diagram illustrating components used in marking Web pages in accordance with a preferred embodiment of the present invention;

Figure 5 is a diagram illustrating an entry in a mark-up table in accordance with a preferred embodiment of the present invention;

Figures 6A and **6B** are diagrams illustrating a graphical user interface of a Web browser plug-in module for marking portions of a Web page in accordance with a preferred embodiment of the present invention;

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Figure 7 is a diagram illustrating a graphical user interface of a Web browser in which a marked portion of a Web page is highlighted in accordance with a preferred embodiment of the present invention;

Figure 8 is a diagram of code for the Web page of **Figure 7** illustrating the anchor tags used to identify portions of the Web page in accordance with a preferred embodiment of the present invention;

Figure 9 is a flowchart of a process for marking a portion of a Web page in accordance with a preferred embodiment of the present invention; and

Figure 10 is a flowchart of a process for presenting a Web page in accordance with a preferred embodiment of the present invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures, **Figure 1** depicts a pictorial representation of a network of data processing systems in which the present invention may be implemented. Network data processing system **100** is a network of computers in which the present invention may be implemented. Network data processing system **100** contains a network **102**, which is the medium used to provide communications links between various devices and computers connected together within network data processing system **100**. Network **102** may include connections, such as wire, wireless communication links, or fiber optic cables.

In the depicted example, server **104** is connected to network **102** along with storage unit **106**. In addition, clients **108**, **110**, and **112** are connected to network **102**. These clients **108**, **110**, and **112** may be, for example, personal computers or network computers. In the depicted example, server **104** provides data, such as boot files, operating system images, and applications to clients **108**-**112**. Clients **108**, **110**, and **112** are clients to server **104**. In this particular example, server **104** may provide Web pages and other content to clients **108**, **110**, and **112**. Network data processing system **100** may include additional servers, clients, and other devices not shown.   In the depicted example, network data processing system **100** is the Internet with network **102** representing a worldwide collection of networks and gateways that use the Transmission Control Protocol/Internet Protocol (TCP/IP)

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suite of protocols to communicate with one another. At
the heart of the Internet is a backbone of high-speed
data communication lines between major nodes or host
computers, consisting of thousands of commercial,
government, educational and other computer systems that
route data and messages. Of course, network data
processing system **100** also may be implemented as a number
of different types of networks, such as for example, an
intranet, a local area network (LAN), or a wide area
network (WAN). **Figure 1** is intended as an example, and
not as an architectural limitation for the present
invention.

Referring to **Figure 2,** a block diagram of a data
processing system that may be implemented as a server,
such as server **104** in **Figure 1,** is depicted in accordance
with a preferred embodiment of the present invention.
Data processing system **200** may be a symmetric
multiprocessor (SMP) system including a plurality of
processors **202** and **204** connected to system bus **206.**
Alternatively, a single processor system may be employed.
Also connected to system bus **206** is memory
controller/cache **208,** which provides an interface to
local memory **209.** I/O bus bridge **210** is connected to
system bus **206** and provides an interface to I/O bus **212.**
Memory controller/cache **208** and I/O bus bridge **210** may be
integrated as depicted.

Peripheral component interconnect (PCI) bus bridge
214 connected to I/O bus **212** provides an interface to PCI
local bus **216.** A number of modems may be connected to
PCI local bus **216.** Typical PCI bus implementations will

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support four PCI expansion slots or add-in connectors.
Communications links to clients **108-112** in **Figure 1** may
be provided through modem **218** and network adapter **220**
connected to PCI local bus **216** through add-in boards.
Additional PCI bus bridges **222** and **224** provide interfaces
for additional PCI local buses **226** and **228**, from which
additional modems or network adapters may be supported.
In this manner, data processing system **200** allows
connections to multiple network computers. A memory-
mapped graphics adapter **230** and hard disk **232** may also be
connected to I/O bus **212** as depicted, either directly or
indirectly.

        Those of ordinary skill in the art will appreciate
that the hardware depicted in **Figure 2** may vary. For
example, other peripheral devices, such as optical disk
drives and the like, also may be used in addition to or
in place of the hardware depicted. The depicted example
is not meant to imply architectural limitations with
respect to the present invention.

        The data processing system depicted in **Figure 2** may
be, for example, an IBM eServer pSeries system, a product
of International Business Machines Corporation in Armonk,
New York, running the Advanced Interactive Executive
(AIX) operating system or LINUX operating system.

        With reference now to **Figure 3**, a block diagram
illustrating a data processing system is depicted in
which the present invention may be implemented. Data
processing system **300** is an example of a client computer.
Data processing system **300** employs a peripheral component
interconnect (PCI) local bus architecture. Although the

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depicted example employs a PCI bus, other bus
architectures such as Accelerated Graphics Port (AGP) and
Industry Standard Architecture (ISA) may be used.
Processor **302** and main memory **304** are connected to PCI
local bus **306** through PCI bridge **308**. PCI bridge **308**
also may include an integrated memory controller and
cache memory for processor **302**. Additional connections
to PCI local bus **306** may be made through direct component
interconnection or through add-in boards.

In the depicted example, local area network (LAN)
adapter **310**, SCSI host bus adapter **312**, and expansion bus
interface **314** are connected to PCI local bus **306** by
direct component connection. In contrast, audio adapter
316, graphics adapter **318**, and audio/video adapter **319**
are connected to PCI local bus **306** by add-in boards
inserted into expansion slots. Expansion bus interface
314 provides a connection for a keyboard and mouse
adapter **320**, modem **322**, and additional memory **324**. Small
computer system interface (SCSI) host bus adapter **312**
provides a connection for hard disk drive **326**, tape drive
328, and CD-ROM drive **330**.

An operating system runs on processor **302** and is
used to coordinate and provide control of various
components within data processing system **300** in **Figure 3.**
The operating system may be a commercially available
operating system, such as Windows XP, which is available
from Microsoft Corporation. An object oriented
programming system such as Java may run in conjunction
with the operating system and provide calls to the
operating system from Java programs or applications

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executing on data processing system **300**. "Java" is a trademark of Sun Microsystems, Inc. Instructions for the operating system, the object-oriented operating system, and applications or programs are located on storage devices, such as hard disk drive **326**, and may be loaded into main memory **304** for execution by processor **302**.

Those of ordinary skill in the art will appreciate that the hardware in **Figure** 3 may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash read-only memory (ROM), equivalent nonvolatile memory, or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in **Figure** 3. Also, the processes of the present invention may be applied to a multiprocessor data processing system.

Data processing system **300** may take various forms, such as a personal digital assistant (PDA) device, which is configured with ROM and/or flash ROM in order to provide non-volatile memory for storing operating system files and/or user-generated data. The depicted example in **Figure** 3 and above-described examples are not meant to imply architectural limitations. For example, data processing system **300** also may be a notebook computer, a kiosk, a Web appliance, or hand held computer in addition to taking the form of a PDA.

The present invention provides a method, apparatus, and computer instructions for marking portions of Web pages for subsequent revisits or retrievals of the Web pages. With the mechanism of the present invention, a user may mark a portion of a Web page using a graphical

user interface provided for a Web browser on a client to select a portion of the Web page. This selection is stored locally on the client on the data structure, such as a table. The information stored is that needed to subsequently present the marked portion when the Web page is revisited. In the illustrative examples, anchor tags in the code for the Web page are used to identify the portion of the Web page selected by the user.

Turning next to **Figure 4**, a diagram illustrating components used in marking Web pages is depicted in accordance with a preferred embodiment of the present invention. In this illustrative example, browser **400** receives Web page **402** which was requested from Web server **408**. Browser **400** may be located on a client, such as data processing system **300** in **Figure 3**, while Web server **408** may be located on a server such as data processing system **200** in **Figure 2**.

Browser **400** is an application used to navigate or view information or data in a distributed database, such as the Internet or the World Wide Web. Browser **400** may be implemented using known browser applications, such as Microsoft Internet Explorer, which is available from Microsoft Corporation.

Browser **400** includes an additional process, marking process **404**. This process is provided to facilitate marking portions of a Web page and representing the marked portions upon a subsequent retrieval upon a Web page. In the illustrative examples, marking process **404** is implemented as a plug-in to browser **400**. A plug-in is an auxiliary program that works with a software

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application to enhance its capability. Plug-ins are added to Web browsers, such as browser **400**, to enable them to support new types of content, such as audio and video. When implemented as a plug-in, marking process **404** may be turned on or off by the user during a browsing session. Depending on the implementation, marking process **404** may be implemented as part of browser **400**, instead of as a plug-in.

A user may mark a portion of Web page **402**. The marking may be accomplished using a graphical user interface with the user initiating an appropriate command to marking process **404** and selecting text. This command may be, for example, selection of an icon or button provided by browser **400**. The selection of the text in Web page **402** may occur, for example, by pressing the right button on a mouse, scrolling along text simultaneously, and then releasing the right mouse button when the desired text has been highlighted. Graphics on Web page **402** may be selected in a similar fashion.

Upon selection of a portion of Web page **402**, information used to identify the selected portion of Web page **402** is stored in a data structure, such as mark-up table **406**. This information is, for example, tags or identifiers for tags in the selected portion of Web page **402**. The location information, URL, for the Web page is stored in association with information used to identify the marked portion of Web page **402**. In the illustrative examples, the URL is used in mark-up table **406** as an index to identify entries corresponding to Web page **402**.

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In the illustrative examples, mark-up table **406** may be, for example, a flat file, a data file, or any other data storage format. Each entry in mark-up table **406** identifies a portion of a Web page that has been marked. If multiple portions of Web page **402** are marked, each marked portion is identified in mark-up table **406** as a separate entry. Alternatively, all of the information may be stored in a single entry.

Upon a subsequent request for Web page **402**, the entry corresponding to the marked portion of Web page **402** is used for special processing by browser **400**. In this example, marking process **404** also functions to present Web pages with marked portions when those pages are subsequently requested. In response to receiving Web page **402** at a subsequent time, marking process **404** searches mark-up table **406** for entries corresponding to Web page **402**. The URL for Web page **402** is used to search mark-up table **406** to determine whether an entry corresponding to a URL is present.

If an entry is present, the entry is used to present Web page **402**. In particular, the identification of anchor tags in mark-up table **406** for the URL corresponding to Web page **402** is used to modify the code in Web page **402** to provide a presentation of the selected portion when Web page **402** is displayed by browser **400**. Alternatively, marking process **404** may modify display information sent to the graphics adaptor.

The presentation of Web page **402** may take different forms. For example, the presentation includes conspicuously identifying the marked portions in a

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display of the Web page. This presentation may involve, for example, highlighting the marked portions, using a different text color, using a different text font type or size, or the like. Other special processing may include, for example, displaying only the marked portions, using speech synthesis (if available) to read marked portions of text to the user, jumping to marked portions of the Web page in response to an input from the user via the client device, and the like. For purposes of the present description, it will be assumed that the special processing is highlighting of the marked portions of the Web page. This special processing may be accomplished in a number of different ways. For example, marking process **404** may modify or add code to Web page **402**, prior to Web page **402** being displayed by browser **400**. However, those of ordinary skill in the art will readily understand in view of the present description, that other special processing may be utilized without departing from the spirit and scope of the present invention.

In this manner, a user may mark portions of the Web page of interest so that the user may easily identify these marked portions at a later time, such as during the same or different browsing session. The mechanism of the present invention also reduces the amount of time required to look up information in Web pages that have already been visited.

With reference now to **Figure 5**, a diagram illustrating an entry in a mark-up table is depicted in accordance with a preferred embodiment of the present invention. In entry **500**, the mark-up information

includes URL **502,** anchor identifier **504,** anchor details **506,** and date/time **508.**

URL **502** is the URL corresponding to the Web page in which a portion has been marked. Anchor identifier **504** is an anchor name and/or number in this example. Anchor details **506** are, for example, the URL of the document and the title of the document. These details are identified by a marking process, such as marking process **400** in **Figure 4.** Depending on the particular implementation, other information from the Web page may be used for anchor details **506.** Date/time **508** is an identification of the date and time when the Web page was marked by the user.

Next, **Figures 6A** and **6B** are diagrams illustrating a graphical user interface of a Web browser plug-in module for marking portions of a Web page in accordance with a preferred embodiment of the present invention. **Figure 6A** illustrates a display of Web page **600** using Web browser **602.** **Figure 6B** illustrates a graphical user interface of a Web browser plug-in module.

As shown in **Figure 6B,** a user may highlight portion **604** of Web page **600** that is to be marked by selecting a beginning of portion **604** by pressing a mouse button and then dragging the mouse cursor across the portion of interest. The user may then use a right click operation to display the pop-up menu **606.** As shown in **Figure 6B,** this pop-up menu **606** includes mark option **608.**

In response to selection of mark option **608,** a marking process, such as marking process **404** in **Figure 4** for Web browser **602** identifies the anchor tags associated

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with the selected portion, portion **604,** of Web page **600.** The marking process then generates an entry in a mark-up table to store information, such as the anchor tags, identifying portion **604** as being a marked portion for Web page **600.**

As a result, this information is stored in the mark-up table by the marking process for identifying the selected portion as being marked for special processing upon revisiting the Web page. The information stored in the table is then used in subsequent visits to the Web site for Web page **600** to accentuate the portions marked during previous requests for this Web page.

With reference to **Figure 7,** a diagram illustrating a graphical user interface of a Web browser in which a marked portion of a Web page is highlighted is depicted in accordance with a preferred embodiment of the present invention. As shown in **Figure 7,** upon a subsequent visit to the Web site and a request for the same Web page marked in the process shown in **Figures 6A** and **6B,** Web page **600** is received by Web browser **700.** In this illustrative example, browser **400** is launched during a later browsing session with respect to browser **602** in **Figures 6A** and **6B.**

Web page **600** is identified as having previously marked portions by searching a mark-up table for an entry corresponding to the URL for Web page **600.** The information in one or more entries corresponding to Web page **600** is used to insert identifiers for the marked portion, portion **604,** of Web page **600.** In the illustrative example, the identifiers are anchor tags

that are recognized only by the marking process to
perform special processing on portion **604**.
Alternatively, these identifiers may be, for example,
additional code that causes portion **604** to be displayed
in a special manner, such as highlighted in a different
color, using a different font type, or using a different
size. In the depicted example, the special processing
involves highlighting the marked portion. Thus, the
user's attention is immediately directed to the
highlighted portion upon revisiting the Web page.

As mentioned above, in a preferred embodiment of the
present invention, anchor tags are utilized to identify
portions of a Web page. **Figure 8** is a diagram of code
for the Web page of **Figure 7** illustrating the anchor tags
used to identify portions of the Web page in accordance
with a preferred embodiment of the present invention. As
shown in **Figure 8**, code **800** of the Web page includes
anchor tags <alt> in lines **802** and **804**, which are used to
identify portions of the Web page. Although the <alt>
tag is illustrated, any specific tag or custom tag may be
used without departing from the spirit and scope of the
present invention.

The <alt> tags may be enumerated in the mark-up
table data structure and may be identified by an anchor
tag number. This anchor tag number indicates the
particular <alt> tag from the top of the Web page code.
The anchor tag number uniquely identifies the tag within
the Web page code and thus, can be used by the mark-up
process to count the anchor tags in the Web page code
from the top of the Web page code, until the identified

number is encountered. Thus, the mark-up process may
parse the Web page code and keep a count of how many of
the anchor tags are identified. When the count reaches,
for example, "7", and the marked portion tag is anchor
tag 7, the mark-up process may identify the portion of
the Web page code between the seventh <alt> tag and the
</alt> tag as the portion of the Web page that was marked
by the user.

In addition to marking of portions of a Web page, as
discussed in the examples above, the present invention
may include an option for "unmarking" or "undoing" a mark
operation in the same or subsequent visit to a Web page.
The unmark option may be provided in a similar manner as
discussed above with regard to the marking option. That
is, a user of a Web browser application on a client
device may select a portion of a displayed Web page by
clicking and dragging a pointer icon across the selected
portion.

A right click of the pointing device, for example,
may then be used to access a pop-up menu that may have
the "unmark" option enabled if the selected portion has
been previously marked in the current or a previous visit
to the Web page. By selecting the "unmark" option from
the pop-up menu, the tags corresponding to the selected
portion of the Web page are removed from the appropriate
entries in the mark-up table indicating marked portions
of the Web page.

With reference next to **Figure 9,** a flowchart of a
process for marking a portion of a Web page is depicted
in accordance with a preferred embodiment of the present

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invention. The process illustrated in **Figure 9** may be
implemented in a marking process, such as marking process
404 in **Figure 4.**

The process begins by receiving a user input (step
900). A determination is then made as to whether the
user input marks a portion of the Web page (step **902**).
If the user input marks a portion of the Web page, an
entry is generated in a mark-up table for the marked
portion (step **904**) with the process terminating
thereafter. With reference again to step **902**, if the
user input does not mark a portion of the Web page, the
process terminates.

With reference now to **Figure 10,** a flowchart of a
process for presenting a Web page is depicted in
accordance with a preferred embodiment of the present
invention. The process illustrated in **Figure 10** may be
implemented in a mark-up process, such as mark-up process
404 in **Figure 4.**

The process begins by identifying the URL for the
Web page (step **1000**). A determination is made as to
whether this URL is present in the mark-up table (step
1002). If the URL is present in the mark-up table, mark-
up information for the entry containing the URL is
retrieved (step **1004**). This mark-up information may
include, for example, identification for an anchor as
well as an anchor number.

Next, a determination is made as to whether another
unretrieved entry is present in the mark-up table for the
URL (step **1006**). If another entry is present, the
process returns to step **1004** as described above.

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Otherwise, the Web page is processed using the mark-up information (step **1008**) with the process terminating thereafter. This processing is performed to present the marked portions when the Web page is displayed.

With reference again to step **1002**, if an entry is not present in the mark-up table, the process ends and the Web page is displayed. In this case, the Web page is displayed normally by the Web browser without any processing being performed by the mark-up process.

Thus, the present invention provides a method, apparatus, and computer instructions for marking one or more portions of the Web page and for presenting those mark-up portions when the Web page is retrieved again at a later time. A user may select a portion of the Web page, such as text and/or graphics, for marking through a graphical user interface. Marking information used to identify the marked portions is stored in a data structure on the client side. This marking information is later used to present the Web page with the marked portions on the Web page when that Web page is subsequently retrieved.

Further, the mechanism of the present invention provides additional advantages through storing mark-up data in a mark-up table locally on the client, rather than on a server. For example, server space is freed up and transaction time for uploading a Web page is reduced. Also, redundancy on server side implementation specifics, such as the use of cookies and database modeling is reduced or eliminated. Further, the cost of developing and maintaining a server side mark-up system is avoided.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.